

Project ideas – ECE723

PROJECT IDEAS:

1. ECG amplifier

The output signal from ECG electrodes is amplified using a low-noise amplifier and displayed on an oscilloscope. A bar-graph display to show the changing heart rate is added too.

2. Digital fiber optical transmitter and/or receiver

Design monolithic transmitters and receivers for on-chip optical communication. These circuits may include AD and DA conversion.

3. Analog tachometer using a photo transducer

An LED-phototransistor combination generates a train of pulses whose frequency depends on the speed of the motor. The pulsed signal is processed to create an analog voltage proportional to the speed. If the speed falls outside a window (200 rpm ... 400 rpm), then a 5kHz square wave (audible frequency) is generated.

4. Variable frequency multiple waveform generator

Generate synchronized triangular, quasi-sine, and sine waveforms with variable frequency within the range 1kHz-100kHz.

5. Voltage to frequency converter (VFC)

Design and analyze a wide dynamic range VFC for a 0 to 5V input range and continuous operation from 100 MHz down to 1 Hz. (see paper)

6. Sample and hold circuit

Design and analysis of a track-and-hold amplifier (THA) with charge-transfer compensation. (see Chapter 9)

7. Monolithic switching regulator

Design of a current mode control monolithic switching regulator. (see Chapter 11)

8. Current-feedback operational amplifier

Transistor-level design and detailed analysis of a high-speed current-feedback operational amplifier.

9. AM modulator

Op Amp circuit to generate (a) full AM signal, (b) suppressed-carrier DSB signal, and (c) SSB signal. A three position switch selects one of the three waveforms.

NOTES:

1. You can propose your own project. It must be related however to the topics of the course. It must be of a certain minimum complexity. It must involve theoretical analysis, simulations, and possibly practical PCB-based implementation.
2. You may want to search on the Internet for design ideas (for example, you may be interested in designing a stereo high performance audio amplifier). One such Internet resource for design ideas is www.edn.com (attached papers are from EDN). Other electronics classes list project ideas (for examples, <http://web.mit.edu/6.101/www/>). There are many more.